Name: Yashica Garg

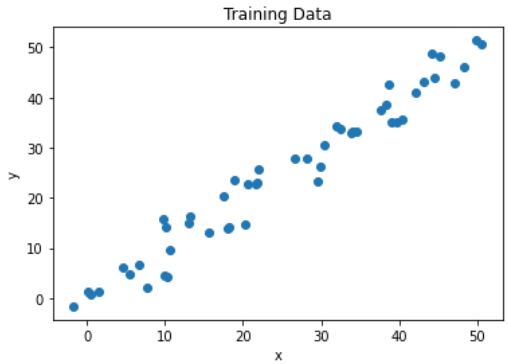
Prn: 20200802125

Creating a Linear Regression Model as an ANN with TensorFlow

```
import numpy as np
import tensorflow as tf
import matplotlib.pyplot as plt
import tensorflow.compat.v1 as tf
tf.disable_v2_behavior()

#Define Fixed seeds
np.random.seed(101)
tf.set_random_seed(101)



# Generating random linear data
# There will be 50 data points ranging from 0 to 50
x = np.linspace(0, 50, 50)
y = np.linspace(0, 50, 50)

# Adding noise to the random linear data
x += np.random.uniform(-4, 4, 50)
y += np.random.uniform(-4, 4, 50)

n = len(x) # Number of data points

# Plot of Training Data
plt.scatter(x, y)
plt.xlabel('x')
plt.ylabel('y')
plt.title("Training Data")
plt.show()


X = tf.placeholder("float")
Y = tf.placeholder("float")


W = tf.Variable(np.random.randn(), name = "W")
b = tf.Variable(np.random.randn(), name = "b")


learning_rate = 0.01
training_epochs = 500

# Hypothesis
y_pred = tf.add(tf.multiply(X, W), b)

# Mean Squared Error Cost Function
cost = tf.reduce_sum(tf.pow(y_pred-Y, 2)) / (2 * n)

# Gradient Descent Optimizer
optimizer = tf.train.GradientDescentOptimizer(learning_rate).minimize(cost)

# Global Variables Initializer
init = tf.global_variables_initializer()


# Starting the Tensorflow Session
with tf.Session() as sess:

  # Initializing the Variables
  sess.run(init)

  # Iterating through all the epochs
  for epoch in range(training_epochs):

    # Feeding each data point into the optimizer using Feed Dictionary
    for (_x, _y) in zip(x, y):
      sess.run(optimizer, feed_dict = {X : _x, Y : _y})

    # Displaying the result after every 50 epochs
    if (epoch + 1) % 50 == 0:
      # Calculating the cost a every epoch
      c = sess.run(cost, feed_dict = {X : x, Y : y})
      print("Epoch", (epoch + 1), ": cost =", c, "W =", sess.run(W), "b =", sess.run(b))
```

```
    # Storing necessary values to be used outside the Session
    training_cost = sess.run(cost, feed_dict ={X: x, Y: y})
    weight = sess.run(W)
    bias = sess.run(b)


# Calculating the predictions
predictions = weight * x + bias
print("Training cost =", training_cost, "Weight =", weight, "bias =", bias, '\n')


# Plotting the Results
plt.plot(x, y, 'ro', label ='Original data')
plt.plot(x, predictions, label ='Fitted line')
plt.title('Linear Regression Result')
plt.legend()
plt.show()
```

```
WARNING:tensorflow:From /usr/local/lib/python3.8/dist-packages/tensorflow/python/compat/v2_compat.py:107: disable_resour
Instructions for updating:
non-resource variables are not supported in the long term
```




```
Epoch 50 : cost = 5.8868036 W = 0.9951241 b = 1.238105
Epoch 100 : cost = 5.79127 W = 0.99812365 b = 1.0914395
Epoch 150 : cost = 5.7119684 W = 1.0008028 b = 0.96044284
Epoch 200 : cost = 5.6459413 W = 1.0031956 b = 0.84343934
Epoch 250 : cost = 5.5907993 W = 1.0053328 b = 0.7389355
Epoch 300 : cost = 5.544608 W = 1.007242 b = 0.6455921
Epoch 350 : cost = 5.5057893 W = 1.008947 b = 0.56221986
Epoch 400 : cost = 5.473066 W = 1.01047 b = 0.48775342
Epoch 450 : cost = 5.445385 W = 1.0118302 b = 0.42124158
Epoch 500 : cost = 5.4219036 W = 1.0130452 b = 0.36183482
Training cost = 5.4219036 Weight = 1.0130452 bias = 0.36183482
```